WHAT IS CLAIMED IS:

1. A system of interactive evaluation of a geometric model comprising:

a computer system, wherein said computer system includes a memory, a processor, a user input device and a display device;

a computer generated geometric model stored in the memory of said computer system; and

a haptic interface operatively in communication with said computer system, wherein said haptic interface includes a haptic device for transmitting information between a user and the geometric model and wherein a haptic device position and orientation are acquired with respect to a surface of the geometric model and mapped into a geometric model coordinate reference system, a closest point position and orientation on the surface of the geometric model to the haptic device position is determined, a surface property at the closest point position and orientation is extracted, and a stick-to-surface force and a property-feedback force are determined and applied to said haptic device to constrain a hand of a user to a surface of the geometric model.

2. A system as set forth in claim 1

including a virtual reality display mechanism operatively in communication with said computer system and said haptic interface, so the user can see the geometric model in a virtual environment.

3. A system as set forth in claim 1 wherein said haptic interface tactilely conveys a surface property of the geometric model to a user through said haptic device and said haptic device is constrained to the surface of the geometric model

4. A method of interactive evaluation of a geometric model, said method comprising the steps of:

acquiring a haptic device position and orientation with respect to a surface of the geometric model, wherein the haptic device is operatively connected to a haptic interface and the geometric model is stored in a memory of a computer system;

mapping the haptic device position and orientation into a geometric model coordinate reference system;

determining a closest point position and orientation on the surface of the geometric model to the haptic device position;

extracting a surface property at the closest point position and orientation;

determining a stick-to-surface force and a property feedback force using the surface property at the closet point position and orientation; and

applying the stick-to-surface force and property feedback force to control a location and force output of the haptic device.

5. A method as set forth in claim 4 including the step of selecting a geometric model from a database in the memory of the computer system prior to said step of acquiring the haptic device position and orientation, wherein the geometric model is a computer-aided design model.

6. A method as set for in claim 5 including the step of configuring the geometric model as a parametric surface, wherein a point representing the model has a set of coordinates within a predetermined coordinate system.

7. A method as set forth in claim 6 including the step of orienting a haptic device position within a haptic device coordinate system.

8. A method as set forth in claim 4 wherein

said step of extracting a surface property includes the step of determining a surface normal at the closest point position and orientation.

9. A method as set forth in claim 4 wherein said step of extracting a surface property includes the step of determining a surface curvature at the closest point position and orientation.

10. A method as set forth in claim 4 including the step of mapping the surface property of the closest point position and orientation into a vector after said step of extracting a surface property.

11. A method as set forth in claim 10 including the step of mapping the surface property of the closest point position and orientation into the haptic device coordinate reference system.

12. A method as set forth in claim 4 wherein said step of applying a stick-to-surface force and a property feedback force includes the step of tactilely conveying a surface property of the geometric model to a user through the haptic device and constraining the haptic device to the surface of the geometric model.

13. A method as set forth in claim 4 wherein the user views the surface of the geometric model using a virtual reality display mechanism in communication with the computer system and the haptic interface.

14. A method as set forth in claim 13 wherein the computer system, haptic interface and virtual reality display mechanism are in communication with each other.

15. A method of interactive evaluation of a geometric model, said method comprising the steps of:

selecting a geometric model from a database in the memory of a computer system;

acquiring a haptic device position and orientation with respect to a surface of the geometric model, wherein the haptic device is operatively connected to a haptic interface;

mapping the haptic device position and orientation into a geometric model coordinate reference system;

determining a closest point position and orientation on the surface of the geometric model to the haptic device position;

extracting a surface property at the closest

point position and orientation;

mapping the surface property of the closest point position and orientation into a vector;

mapping the surface property of the closest point position and orientation into the haptic device coordinate reference system;

determining a stick-to-surface force and a property feedback force using the surface property at the closet point position and orientation; and

applying the stick-to-surface force and property feedback force to control a location and force output of the haptic device, wherein the haptic device tactilely conveys a surface property of the geometric model to a user and the haptic device is constrained to the surface of the geometric model.

16. A method as set forth in claim 15 including the step of configuring the geometric model as a parametric surface, wherein a point representing the model has a set of coordinates within a predetermined coordinate system.

17. A method as set forth in claim 16 including the step of orienting a haptic device position within a haptic device coordinate system.

18.   A method as set forth in claim 15 wherein said step of extracting a surface property includes the step of determining a surface normal at the closest point position and orientation.

19.   A method as set forth in claim 15 wherein said step of extracting a surface property includes the step of determining a surface curvature at the closest point position and orientation.

20.   A method as set forth in claim 15 wherein the user views the surface of the geometric model using a virtual reality display mechanism in communication with the computer system and the haptic interface.